Citation:

Qureshi AI, Suri FK, Ahmed S, Nasar A, Divani AA, Kirmani JF. Regular egg consumption does not increase the risk of stroke and cardiovascular diseases. *Med Sci Monit.* 2007 Jan;13(1):CR1-8. Epub 2006 Dec 18.

PubMed ID: 17179903

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To study the association between egg intake and risk of cardiovascular diseases and mortality in the NHANES-I study sample.

Inclusion Criteria:

Subjects from the NHANES-I Epidemiologic Follow-Up Study (NHEFS).

Exclusion Criteria:

- Unknown daily egg consumption
- Personal history of stroke or coronary artery disease
- Incomplete data on egg intake
- Missing data for cholesterol, body mass index, or systolic blood pressure

Description of Study Protocol:

Recruitment - A nationally representative cohort of subjects from the NHANES-I Epidemiologic Follow-Up Study (NHEFS).

Design: Prospective cohort study

Blinding Used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Multivariate and univariate analyses
- Cox proportional hazard analysis estimated relative risk (RR) for the coronary artery disease, mortality, and the 2 types of stroke.
- Analysis of subsets was conducted.
- SPSS version 9 software was used for analyses.

Data Collection Summary:

Timing of Measurements - Four follow-up periods (1982-1984, 1986, 1987, 1992)

Dependent Variables

- Incident stroke or ischemic stroke (measured using ICD-9-CM code with a hospitalization or death listing either condition as a primary diagnosis during the 20-year follow-up period). Stroke was defined as hemorrhagic or ischemic but not transient ischemic events.
- Coronary artery disease was present if ICD-9-CM code 410-414 were listed.
- Mortality

Independent Variables

- Egg consumption was categorized into no or less than 1 egg, 1 to 6 eggs, or greater than 6 eggs per week

Control Variables

- Age
- Gender
- Race
- Serum cholesterol level
- BMI
- Diabetes mellitus
- Systolic blood pressure
- Educational status
- Cigarette smoking

Description of Actual Data Sample:

Initial N: 13,586 adults

Attrition (final N): 9734 (3756 males, 5978 females)

Age: Subjects were ages 25 to 74 at the time of the original study (4407 less than age 45 years, 2521 aged 46 to 64 years, 2806 aged 65 and older)

Ethnicity: 8071 white, 1663 black/other

Other relevant demographics

- Education: 4637 with less than 12 years, 3033 had 12 years, 2064 had greater than 12 years
- Smoking status: 6281 never smoked/unknown, 3453 current/past smokers

Anthropometrics

- 9385 subjects with diabetes
- All stroke - 655 subjects
- Ischemic stroke - 1584 subjects
- Coronary artery disease - 591 subjects
- Mortality - 3177 subjects

Location: Epidemiological and Outcomes Research Division, Zeenat Qureshi Stroke Research Center, Department of Neurology and Neurosciences, University of Medicine and Dentistry of New Jersey, Newark, NJ

Summary of Results:

Key Findings

- After adjusting for several factors, no relationship was observed between consuming > 6 eggs/week and risk of stroke (RR 0.9, 95% CI 0.7-1.1).
- There was also no relationship between > 6 eggs/week and risk of ischemic stroke (RR 0.9, 95% CI 0.7-1.1) or coronary

artery disease (RR 1.1, 95% CI, 0.9-1.3).
- Subjects with higher egg intake had no significant difference than lower intake groups in RR for risk of myocardial infarction (RR 1.0, 95% CI 0.9-1.3) or all-cause mortality (RR 1.0, 95% CI 0.9-1.1).
- There was an increased risk for myocardial infarction in some of the diabetic subjects who consumed > 6 eggs/week (RR 2.0, 95% CI 1.0-3.8). This same risk was not observed for either type of stroke. The relationships were not significant in non-diabetic subjects.

	≤ 1 egg/week	1 - 6 eggs/week	> 6 eggs/week
N	1628	6139	1967
Body Mass Index	25.6 ± 5.0	25.7 ± 5.1	25.8 ± 5.2
Serum cholesterol (mg/dl)	222.1 ± 51.7	219.8 ± 48.1	223.0 ± 49.7
All stroke (N)	128	368	159
Ischemic stroke (N)	259	942	383
Coronary artery disease (N)	120	331	140
Mortality (N)	583	1808	786

Author Conclusion:

Our study demonstrated that consumption of greater than 6 eggs per week or 1 egg or greater per day did not increase the risk of coronary artery disease, ischemic stroke, or all strokes in a cohort representative of US population.

Reviewer Comments:

Nationally representative sample.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	No
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes

1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes

5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes

8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes